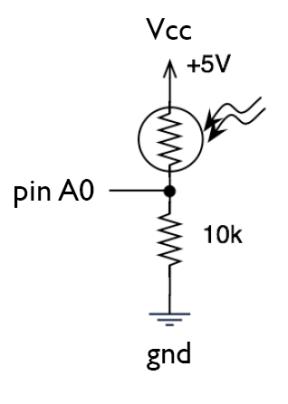
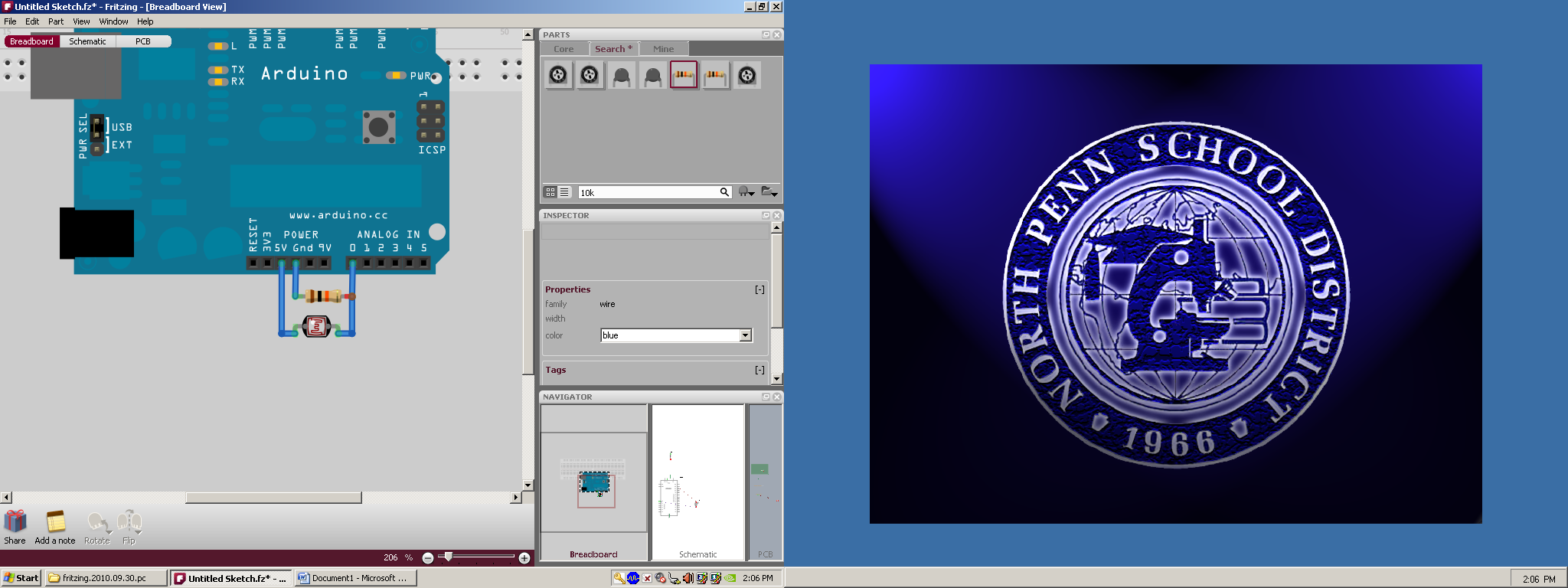
**Lab 4 – Analog Input**

***The lab introduces the input features of the microcontroller. Arduino can output data (LEDs, etc.) and also receive data from the environment (movement, temperature, light, etc.). In this lab, you will experiment with these analog inputs (not just on or off) to ultimately create a light controlled switch.***

**Hardware Required**Arduino Board LED  
10kΩ resistor (brown black orange)  
photocell   
miscellaneous jumper wires

**Circuit**

Connect a wire to pin 5V, Gnd, and Analog In pinO (AO; see photo). Take those three loose wires and connect them to empty slots on the breadboard, making sure they don’t touch each other. On the breadboard, connect a resistor between Gnd and AO. Also connect a photocell to AO, but connect the other end to 5V.

**Basic Code Explanation**

In the program below, only a few lines of code are used to get the photocell’s light values into the computer. The line: *Serial.begin(9600)* tells the computer to look for a serial input. In your case, transmission occurs from the USB cable. It’s still called the ‘serial’ line. The 9600 is transfer speed from the board to the computer.  *Serial.println(sensorValue, DEC);* This command will send information from “sensorValue” to the computer. The DEC tells the computer what type of number to look for. For now accept that DEC is a normal number.

**Directions**

Run sample code 1. Open the serial monitor and watch the values change as you “cover” and “uncover” the light sensor. Right down the covered and uncovered values.

Sample code 1

------------------------------------------------------------------

*// Reads an analog input on pin 0, prints the result to the serial monitor*

*// This example code is in the public domain.(Arduino.cc)*

*void setup() {*

*Serial.begin(9600); // opens the serial communication line*

*}*

*void loop() {*

*int sensorValue = analogRead(A0); //takes values from the analog pin*

*Serial.println(sensorValue, DEC);*

*}*

------------------------------------------------------------------

Once the program works, observe its behavior. Make sure to open the serial monitor to view the data streaming into the computer. Obtain the instructor’s initials here (\_\_\_)

Write the values down you’re getting from the serial monitor.  
  
Uncovered: \_\_\_\_\_\_\_\_\_\_\_\_\_ Covered: \_\_\_\_\_\_\_\_\_\_\_\_

**Modify the Program**Add a delay to the program to change how fast it picks another value from the light sensor. (\_\_\_)

Sample code 2

*/\**

*This program controls the state (HIGH, or LOW) of an output based on analog values returned from the selected analog pin. You need to change the two values below labeled “NNN”. Use one of the numbers you wrote down from page one. Simply put, it turns a light on when the ambient light in the room decreases.*

*\*/*

*#define LED 13*

*int lightval = 0;*

*void setup() {*

*pinMode(LED, OUTPUT);*

*}*

*void loop() {*

*lightval = analogRead(0); // take the value from the photocell on A0 and store*

*// it in a variable named lightval*

*if (lightval < NNN ) {*

*digitalWrite (13, HIGH);*

*}*

*else if (lightval > NNN ) {*

*digitalWrite (13,LOW);*

*}*

*}*

Once the program works, observe its behavior. Obtain the instructor’s initials here (\_\_\_)

**Modify the Program**Program the light to turn on when it becomes light out. (\_\_\_)

Combine program 1 and 2 to display the light values on the serial monitor while the program controls the light. (\_\_\_)

Swap out the photocell with a temperature sensor. It’s actually a resistor which changes its resistance value based on the heat in the room, or from your hands. (\_\_\_)

* What value displays for room temperature \_\_\_\_

List five places where analog values can control things in or around your home.

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_